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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,495	07/22/2003	Takeo Kawase	116637	6345
25944	7590	12/14/2004	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			DOLAN, JENNIFER M	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/623,495

Applicant(s)

KAWASE, TAKEO

Examiner

Jennifer M. Dolan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on pre-Amdt. 7/22/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-11, 14-23 and 25-36 is/are rejected.
- 7) ☒ Claim(s) 7, 12, 13 and 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/7/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3, 5, 6, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent Publication No. 2001/0046202 to Tanaka et al.

Regarding claims 1 and 2, Tanaka discloses a patterning method comprising forming an indent depression (17a) in the surface of a substrate (11) and depositing a liquid material (19) onto the surface at selected locations such that spread of the material over the surface is controlled by the indent region (paragraphs 0022, 0036, 0057; figures 5-6).

Regarding claim 3, Tanaka discloses that the indent region (17a) is formed by providing at least one raised portion (18a) extending from the substrate (figures 1f, 1g, 5).

Regarding claims 5 and 6, Tanaka discloses providing wall portions (of 17a) sloped relative to the surface such that the width tapers towards the bottom surface of the indent region (figures 1f, 1g).

Regarding claim 19, Tanaka discloses that the indent regions are formed by an impression technique (paragraphs 0049-0051).

3. Claims 1-6, 8, 9, 11, 14, and 18-22 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication No. 2003/0235678 to Graham et al.

Regarding claims 1 and 2, Graham discloses a patterning method comprising forming indent depressions (figures 1, 2, 5) in the surface of a substrate, and depositing a liquid material onto the surface at selected locations such that the spread of the material over the surface is controlled by the indent region (paragraphs 0012; 0015; 0036-0039).

Regarding claim 3, Graham discloses that the substrate has raised portions (521) extending from the surface (figure 5).

Regarding claims 4-6, Graham discloses that the wall portions are orthogonal to the surface, sloped relative to the surface, and can have widths tapering toward the bottom surface (i.e. 'truncated pyramid structure') of the indent (paragraph 0039).

Regarding claims 8, 9, 11, and 14, Graham discloses that the indent has a cross-sectional profile (540), including castellated configurations (paragraphs 0039, 0046-0049; figure 5) capable of providing a secondary barrier (see paragraphs 0048-0051). Graham further teaches providing first and second indent depressions (figures 1, 2, 5) in the surface of a substrate and impressing a further elongate indent region between but spaced from the first and second regions (figures 2 and 5 show a large number of spaced indent regions), wherein the further elongate indent region has a substantially planar bottom surface (figure 1; secondary microstructure is very small, making it "substantially planar" with respect to the indent walls).

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Regarding claim 18, Graham discloses adjusting the wetting characteristic of the substrate (paragraph 0055-0058).

Regarding claims 19-22, Graham discloses providing the indent regions using impression techniques, such as stamping or molding (paragraphs 0071-0072) and heating the surface (paragraphs 0072; 0076; 0077).

4. Claims 1-4 and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication No. 2003/0080143 to Kale et al.

Regarding claims 1-4, Kale discloses a patterning method comprising forming an indent region comprising depressions into the substrate and raised portions projecting from the substrate (figure 9) in the surface of a substrate (12) and depositing a liquid material (10) onto the surface at selected locations such that the spread of the material over the surface is controlled by the indent region (see figures 9-10; paragraphs 0023, 0142-0143), wherein the wall portions of the indent are substantially orthogonal (figure 9).

Regarding claim 18, Kale discloses adjusting the wetting characteristic of the surface of the substrate relative to the material to be deposited (paragraph 0143).

5. Claims 1, 2, 30, and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication No. 2004/0009608 to Caren et al.

Caren discloses a DNA array microchip (paragraph 0002) wherein the structure is patterned by forming an indent depression in the surfaces of a substrate (paragraph 0041;

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figure 11; figure 12) and depositing a liquid such that the spread of the material is controlled by the indent region (paragraph 0041; 0006, 0007; figure 11).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Graham et al.

Graham teaches that saw-tooth shapes are appropriate for the microstructured fluid barrier (paragraph 0039), and that a secondary barrier in the indent can be provided for enhanced control (paragraphs 0047-0049).

Graham fails to specifically state that the secondary barrier may have a saw-tooth shape.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the indent region of Graham, such that the secondary barrier has a saw-toothed profile. The rationale is as follows: A person having ordinary skill in the art would have been motivated to provide a saw-toothed profile, because Graham teaches that any geometric shape including vertical or angled walls can be advantageously used as an element to control microfluid placement (paragraphs 0038-0039). Since the secondary barrier structure serves a similar function as the primary

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structure, and since Graham only specifically teaches the shapes appropriate for the primary structure and not for the secondary structure, it is well within the purview of a person having ordinary skill in the art to deduce that the cited microstructured elements for controlling the placement of individual fluid drops are appropriately used for both the primary and secondary microstructures (see Graham, paragraphs 0038-0039).

8. Claims 1, 15, 16, 23, 25, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,723,394 to Sirringhaus et al. in view of Kale et al.

Sirringhaus discloses using an ink jet fluid deposition method to deposit elongate electrode regions (source and drain; see figures 1 and 3a) for a TFT electronic device, wherein the ink-jet deposited material is a conductive polymer, such as poly-3-4-ethylenedioxythiophene (column 6, lines 18-24).

Sirringhaus fails to specify exactly how the spread or location of the ink-jet deposited polymer is controlled.

Kale teaches controlling the position, volume, and spread of deposited fluids by providing indent regions in a substrate, and then depositing the fluid in the raised regions between indents (paragraph 0142; figure 9).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the PCB production method of Sirringhaus, such that indent regions to control ink jet fluid flow are utilized, as taught by Kale. The rationale is as follows: A person having ordinary skill in the art would have been motivated to provide indents in the surface of the substrate, because Kale shows that using an indent structure in which fluids are deposited on the raised surface between indents provides

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very precise control of the volume and spread of the deposited fluid (see Kale, paragraphs 0142), which in turn allows for greater precision in aligning the source and drain electrodes and accurately defining the channel region, as is appreciated by one skilled in the art.

9. Claims 1, 15, 17, 27, 29, 33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,668,533 to Miller in view of Kale et al.

Regarding the claims, Miller discloses using ink-jet printing to form a printed circuit board/interconnect structure (column 2, lines 30-35, 58-62; column 3, lines 25-68), including forming the conductive traces and electrodes (i.e. elongate metal regions) by ink-jet depositing a colloidal suspension of metal particles in a solvent (column 4, lines 14-45).

Miller fails to specify exactly how the spread or position of the ink jet fluid is controlled.

Kale teaches controlling the position, volume, and spread of deposited fluids by providing indent regions in a substrate, and then depositing the fluid in the raised regions between indents (paragraph 0142; figure 9).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the PCB production method of Miller, such that indent regions to control ink jet fluid flow are utilized, as taught by Kale. The rationale is as follows: A person having ordinary skill in the art would have been motivated to provide indents in the surface of the substrate, because Kale shows that using an indent structure

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in which fluids are deposited on the raised surface between indents provides very precise control of the volume and spread of the deposited fluid (see Kale, paragraphs 0142), which in turn allows for greater precision in forming the connection traces and greater potential for miniaturization, as is appreciated by one skilled in the art.

10. Claims 1, 26, 28, 32, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,022,647 to Hirose et al. in view of Kale et al.

Hirose discloses both a color filter and an LCD (electrooptic device; see column 2, lines 28-63) wherein the pigments are patterned by providing a barrier structure (figures 1) with “indents” therebetween, and depositing a liquid material (4) onto the surface at selected locations such that the spread of the material over the surface is controlled by the indent region (figures 1A-1D).

Hirose fails to teach that the indent regions are formed in the surface of the substrate.

Kale discloses that fluid spread can be controlled by alternatively providing either indents in the surface of the substrate (figure 9), or a barrier structure substantially similar to that of Hirose deposited on the substrate (figure 10)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Hirose, such that the indents are formed in the surface of the substrate, as suggested by Kale. The rationale is as follows: A person having ordinary skill in the art would have been motivated to provide indents in the surface of the substrate, because Kale shows that both structures can equally confine a deposited droplet (Kale, paragraphs 0142 and 0143; figures 9 and 10), and thus are

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recognized art equivalents. A person skilled in the art would find a structure with indents provided in the substrate advantageous, because it eliminates the need to introduce a barrier material into the process and provides very precise control of the volume of the droplet (see Kale, paragraphs 0142-0143).

Allowable Subject Matter

11. Claims 7, 12, 13, and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: The primary reason for allowability is that the prior art offers no suggestions of using an indent widening toward the bottom surface (cl 7), using a group of three indent structures to separately control the deposition of source and drain regions for a TFT (cl 12-13), or coating a substrate with an indent region with aluminum, and then fluid-depositing a PEDOT film on the aluminum (cl 24).

For claim 7, the prior art suggests using a variety of configurations of indent wall structures ranging from vertical walls to sloped walls with a width narrowing toward the bottom of the indent region (see Graham, for example). Since the angle between the indent wall and the raised upper surface greatly influences the surface tension of the droplet, and hence, the volume of liquid that can be 'contained' by the raised region, and since a widening indent region would require complicated processing to manufacture the overhang, it is the examiner's opinion that such a modification would not be trivial.

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For claims 12 and 13, the prior art, such as U.S. Patent No. 6,087,196 to Sturm et al., suggests using an ink jet deposition to deposit a semiconductor active region for a TFT. The prior art does not, however, suggest using indents to separately control the extent of the source, drain, and channel regions, nor does it teach an individual deposition of only the source and drain regions, rather than the entire active region. The primary reason for allowability is that there is simply no motivation in the prior art for these recited limitations.

For claim 24, the prior art fails to suggest coating any part of the indented surface with aluminum before depositing the PEDOT film. Since the material composition of the indent structure affects the hydrophobic/hydrophilic nature of the raised surface, and hence influences the ability of the indent region to confine a deposited droplet, and since there is no suggestion in the prior art of depositing droplets of PEDOT on aluminum ridges, it is the examiner's opinion that the provision of an aluminum coating would not have been obvious to a person having ordinary skill in the art.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 6,087,196 to Sturm et al teaches the use of ink jet deposited semiconductor material for forming the active region of a TFT.

U.S. Patent No. 6,359,501 to Aoki et al. teaches a plasma display using indents in a substrate for confining a fluid deposited directly in the indents.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan
Examiner
Art Unit 2813

jmd


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